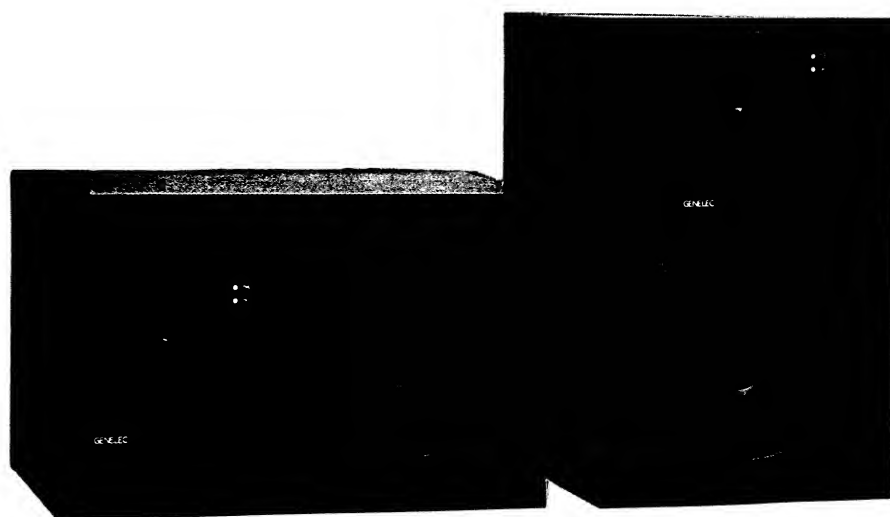


# GENELEC®

Genelec 1031A  
Monitoring Speaker

Service  
Manual



## Notice

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**This Service Manual is valid from S/N 3000**

### 1031A Revision history

S/N 510	C18 10 UF/25V --> 1 UF/35 V	Improves muting at switch-off
S/N 794	IC1 (on crossover filter board) TL072 --> NE5532	Improves distortion properties at high frequencies
S/N 1198	- added R129 1k00 0.6W on main board - added support for PA-driver boards and power supply capacitors - 400 added to crossover filter board component numbering (R1 --> R401 etc).	PC-board changed to version A
S/N 2300	- added places for components needed in 1032A	PC-board changed to version B
S/N 3000	- Bass driver changed and bass ring added	Bass driver fixed with 6 screws

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## 1. General Information

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### 1.1 Description

The 1031A is a compact monitoring speaker designed for broad band high output and low coloration.

Due to its small cabinet, this speaker is ideally suited to applications such as: high powered Near Field monitoring, TV broadcast monitoring and mobile vans. This speaker's precision even allows for CD mastering. It may be either horizontally or vertically mounted, by simple rotation of the Directivity Control Waveguide (DCW).

Designed as an active speaker, this unit includes drivers, power amplifiers and active crossover filtering. This provides a totally dedicated and reliable system which simply requires a signal input and a mains supply.

The amplifier unit is mounted to the rear of the speaker cabinet on quick release vibration isolators, to ensure long term reliability. This unit incorporates power amplifiers, bass and treble driver overload protection, amplifier thermal overload protection, active crossover filter, treble tilt, bass tilt and bass roll-off controls.

By use of active tone controls, this speaker may be exactly matched to any application. These include free field mounting, near field on top of console, wall mounting in control room and even corner mounting. These versatile controls allow for precise alignment of the speaker to differing acoustic environments, making it a true all rounder.

The 1031A uses DCW technology in conjunction with some of the finest driver technology.

The woofer unit is a high efficiency 210 mm polymer composite cone, custom optimized for use in a small active cabinet.

The tweeter unit is a 25 mm metal dome with pure piston behavior upto 23 kHz. When mounted in the DCW this driver offers superior transient and off axis response to conventional direct radiating soft domes.

These have resulted in perfect driver directivity matching as well as phase and delay uniformity at the crossover frequency.

DCW technology also ensures low diffraction and constant directivity in addition to providing higher driver sensitivity. The speaker's response is thus flat upto an angle of 60 degrees.

The cabinet is constructed of veneered MDF, which is heavily braced to eliminate structural resonance.

Carefully placed damping remove internal standing waves which might lead to coloration in the midrange.

Non resonant port techniques have been employed to eliminate the effects of port ringing found in conventional designs.

## 1.2 Technical specifications

### 1.2.1 System specifications

Lower cut-off frequency, -3 dB: 47 Hz

Upper cut-off frequency, -3 dB: 22 kHz

Free field frequency response

of system: 48 - 22 kHz (2 dB)

Maximum short term sine wave  
acoustic output on axis  
in half space, averaged from  
100 Hz to 3 kHz:

@1m > 110 dB SPL  
@0.5m > 116 dB SPL

Maximum long term RMS  
acoustic output in same conditions  
with IEC-weighted noise:

@1m > 101 dB SPL  
@0.5m > 107 dB SPL

Maximum peak acoustic output  
per pair on top of console,  
@ 1m from the engineer  
with music material:

> 120 dB

Self-generated noise level in  
free field @ 1m on axis

< 10 dB

Harmonic distortion at 85 dB SPL

at 1m on axis: freq. < 300 Hz < 1%  
freq. > 300 Hz < 0.5%

Drivers

Bass 210mm (8") polymer  
composite cone woofer  
Treble 25mm (1") metal dome

Weight:

12 Kg (26 lb)

Dimensions:

Height 390mm  
Width 250mm  
Depth 290mm

**1.2.2 Amplifier section**

Bass amplifier output power with an 8 ohm load:  
momentary 120 W

Treble amplifier output power at 8 ohm load:  
momentary 120 W

Long term output power is limited by driver  
unit protection processor.

Protection level:	Bass	15 VRMS
	Treble	4.5 VRMS
Slew rate		80 V/us

**Amplifier system distortion**

at nominal output:	THD	$\leq 0.05 \%$
	SMPTE-IM	$\leq 0.1 \%$
	CCIF-IM	$\leq 0.1 \%$
	DIM100	$\leq 0.1 \%$

Signal to Noise ratio, from shorted system  
input to channel output, referred to full  
output:

bass	100 dB
treble	100 dB

Mains voltage:	100/200V or 115/230 V
Voltage Operation Range:	$\pm 10 \%$

Power consumption:	idle	30 VA
	full output	160 VA

**1.2.3 Crossover section**

Input connector:	XLR female	pin 2 + pin 3 -
------------------	------------	--------------------

Input impedance:	10 k balanced
------------------	---------------

Subsonic filter below 45 Hz:	18 dB/octave
------------------------------	--------------

Ultrasonic filter above 25 kHz:	12 dB/octave
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Crossover frequency:	2.2 kHz
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Crossover acoustical slopes:	24 dB/octave
------------------------------	--------------

Treble tilt control operating range in 2dB steps:  
from +2 to -4 dB & MUTE

Bass roll-off filter in 2 dB steps:  
from 0 to -8 dB

Bass tilt control in 2 dB steps:  
from 0 to -6 dB & MUTE

The 'CAL' position is with all controls set to 'off'.

## 2. Functional description

### 2.1 General description

A simplified block diagram of GENELEC 1031A Monitoring System is shown in Figure 2.1 below. The signal from the XLR input connector is taken via a balanced amplifier, attenuator, and buffer amplifier to the active crossover filter. The signal is divided in the filter into the bass and treble channels and finally amplified with separate power amplifiers for each driver unit. The bass and treble driver units are protected against excessive power levels by a special protection circuit.

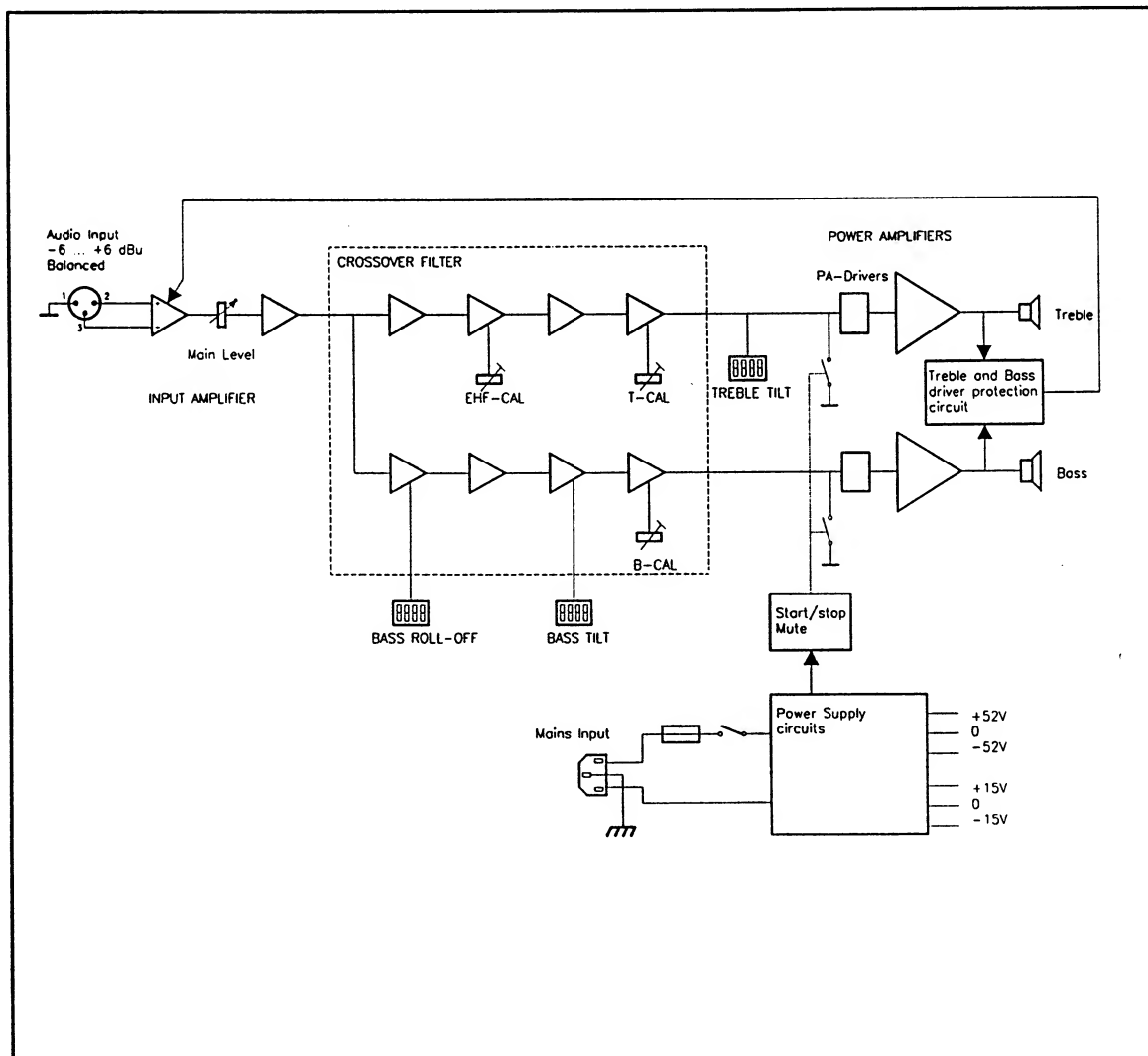


Figure 2.1 Functional Block Diagram of Genelec 1031A Monitoring System

## 2.2 Circuit Description

Refer to the circuit diagrams in Section 6 of this manual.

### 2.2.1 Input amplifier and crossover network

The circuitry of the input amplifier is shown in Figure 6.5. Balanced input with a soft high-frequency roll-off is provided by operational amplifier IC1A. Next to the input amplifier is the volume control and a buffer amplifier IC1B to feed the active crossover filter.

The circuitry of the active crossover filter is shown in Fig.6.2. The filter consists of four dual-operational amplifier ICs mounted on a separate plug-in circuit board. The filter board is attached to the main board by a 10-pin connector and two fasteners. The component layout of the filter section is shown in Fig. 6.4.

The crossover filter includes three calibrating trimmers TR1 ... TR3 and three DIP-switches SW101 (BASS ROLL-OFF), SW102 (BASS TILT) and SW103 (TREBLE TILT). The switch controls are mounted on the main board and can be accessed by an user via holes on the rear panel. The switches are used for balancing the room response in different speaker mounting locations. Flat anechoic response is achieved with all controls in OFF-positions.

The calibrating trimmers are set by the manufacturer and a special measuring equipment is needed during adjustment. The crossover filter response curves and total voltage gain curves of the amplifier channels are shown in Figures 4.2 and 4.3 in section 4 of this manual.

### 2.2.2 Treble and mid-range driver protection circuit

Driver protection and muting circuits are shown in Figure 6.1. Signals from treble and bass power amplifier outputs are rectified by diodes D5 and D7. If the signal amplitude exceeds the safe level of the driver, transistor T11 begins to conduct and supplies current to analog opto isolator IS1. The output side of the opto isolator is connected in parallel to the feedback resistor R111 of IC1B at the input stage. When the value of feedback resistor is reduced, the gain of the input stage is decreased, and signal level at the power amplifier output is lowered. Components R25-R27, C13, C14 and R37, R39, C15, C16 form two delaying networks simulating the thermal time constants of the treble and bass drivers. If the protection circuit is activated the time constants of the delaying network is reduced by switching capacitors C14 and C16, off from the circuit with comparator IC2. This is needed to reduce the effect of short term signal peaks to rise the temperature of driver voice coils during continuous overdrive condition.

The noises that occur when switching the amplifier on and off are eliminated by a muting circuit consisting of T12 with surrounding components (see Figure 6.10). When the power is first turned on, the

+ 15 V supply voltage rises quickly. Capacitor C17 charges and supplies base current to switching transistors T101 and T102 biasing them on momentarily. Capacitor C18 charges via D10 to a positive voltage and biases T12 off. During switch-off, C18 discharges quickly via R49 and T12 start to conduct, keeping transistors T101 and T102 conducting long enough to suppress filter switch-off noises.

### 2.2.3 Power Amplifiers

The power amplifier consists of two similar channels for bass and treble as shown in figures 6.7 and 6.8. The input and voltage amplification stages of each power amplifier channel are located on two separate circuit boards connected to main board via a 10-pin connectors J1 and J2. The circuit boards are made using surface mount technology (SMT) and service of the board is not recommended. The circuit board can easily be changed if any service is needed.

The circuitry of the two channel power amplifier is shown to the right of driver blocks. Both channels are similar and only treble channel is reviewed here. Audio signal from the driver module is brought to the power amplifier via connector J1 pins 2 and 6. Darlington transistor T1 is thermally coupled to power transistor heat sink and its function is to keep the bias current of the power transistors constant during temperature variations. The bias current can be set by trimmer potentiometer TR1. Transistors T2 and T3 form a darlington driver stage for output transistors T4 and T5.

Comparator stage IC2A (see Figure 6.9) is driven by CLIP-signal generated on the power amplifier driver boards. If the driver stage is overdriven this signal contains pulses which pull IC2A output to ground and the CLIP-LED mounted on the front panel of the speaker enclosure is illuminated.

Comparator IC2D detects if the driver protection is activated and illuminates the same LED via a common CLIP/PROTECT-line.

### 2.2.4 Power supply

The circuitry of the power supply is shown in Figure 6.10. The primary side of toroidal transformer T1 has two windings of 100 or 115 V which can be connected in parallel for 100/115 V mains voltages or in series for 200/230 V mains voltages. The RC-network R301, C301 is a suppressing circuit to damp voltage peaks generated during closing or opening mains switch K301.

The secondary voltage of mains transformer is rectified by BR201 and filtered with capacitors C201 and C202 to power amplifier operating voltages. The voltage of  $\pm 15$  V for the crossover filter and input stages is rectified by BR1 and stabilized with the aid of regulators IC4 and IC5. Both voltages have their own windings in the transformer secondary.

### 3. Adjustments

#### 3.1 Test configuration

The test equipment required for making adjustments is listed in table 3-1 below. Equipment other than listed may be used if critical specifications are met.

Equipment	Specification
True RMS Voltage Meter	Frequency Range 20 Hz ... 20 kHz
DC Digital Voltage Meter	Input Voltage Range 200 mV ... 200 V
Oscilloscope	Bandwidth DC ... 20 MHz Input Sensitivity 0.1 V ... 10 V/div Time Base 0.1us/div ... 0.5 s/div
Audio Generator	Frequency Range 20 Hz ... 20 kHz THD < 0.1 %

Table 3-1 Recommended Test Equipment Set

#### 3.2 Adjustment points

The location of all adjustment points is shown in Figure 3.1 at the end of this section. The adjustment trimmer potentiometers are mounted on the circuit board; gaining access to the controls only requires opening the rear panel. Instructions for dismantling the rear panel are given in paragraph 4.3.1. See section 4.1 *Safety considerations* before opening the rear panel.

The main circuit board is equipped with a 16-pin diagnostic connector J5. The connector is used by the manufacturer during final inspection, and a dedicated set of test equipment is needed for this test.

When measuring the power amplifier output DC voltages, a digital voltage meter or an oscilloscope is needed and it is connected between ground and a proper pin in speaker connector J3 where all power amplifier output signals are found. Because the treble amplifier has a series capacitor (C31) at its output, the offset voltage of it must be measured directly at emitter resistor R6. When measuring the bias currents, a digital voltage meter is connected over the corresponding emitter resistor (R6 or R17). The speaker cable must be disconnected from the speaker output connector before measuring the bias currents. This precaution is mandatory because the bass and mid-range amplifiers are DC coupled and DC current through the driver element causes measurement error when the offset voltage of the channel under test deviates from zero.

### 3.3 Adjustment procedures

Refer to Figure 3.1 in the next page.

#### 3.3.1 Bass amplifier offset voltage and bias current adjustment

- a. Disconnect the speaker cable from connector J3.
- b. Allow the amplifier to warm up for 15 minutes.
- c. Set the DVM to 200 mV range. Connect the DVM to output pin B+ (pin 2 in connector J3) and ground.
- d. Adjust trimmer marked B-OFFSET on lower PA-Driver board to a DVM reading of zero volts.
- ~~e. Connect the DVM across resistor R17.~~
- f. Adjust trimmer marked B-BIAS (TR2 on the main board) to a DVM reading of  $10 \pm 1$  mV.

#### 3.3.2 Treble amplifier offset voltage and bias current adjustment

- a. Repeat steps (a) above. Connect a DVM across treble amplifier direct output (upper end of R6) and ground. The DC voltage cannot be measured from J3 because there is a series capacitor at the treble amplifier output.
- b. Adjust trimmer marked T-OFFSET on upper PA-Driver board to a DVM reading of zero volts.
- c. Connect a DVM across resistor R6.
- d. Adjust trimmer marked T-OFFSET (TR1 on the main board) to a DVM reading of  $10 \pm 1$  mV.

#### 3.3.3 Crossover network level control adjustment

The crossover filter has three calibrating trimmer potentiometers TR1 ... TR3, mounted on the filter board. Different driver element sensitivities can be compensated for by these trimmer potentiometers. The trimmer potentiometers are set for flat acoustic response at the factory and readjustment is required only after driver replacement. Special acoustic measurement equipment is needed during the adjustment.

It is possible to 'coarse' calibrate the channel gains by using total voltage gain check as shown in section 4.4.2. The calibrating is not exact because it does not observe driver sensitivity variations.

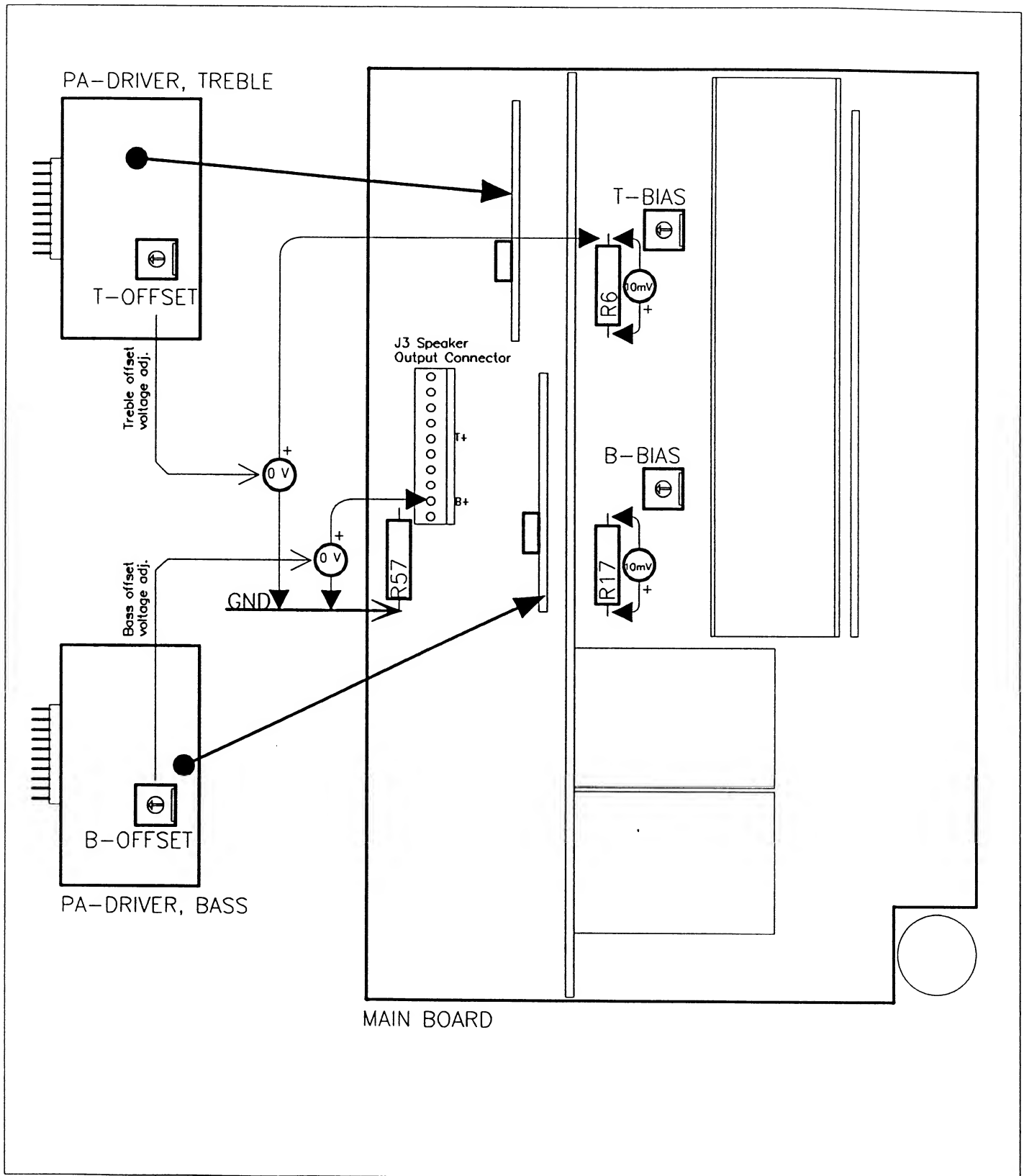


Figure 3.1 Adjustment points and connector locations

## 4. Servicing

### 4.1 Safety considerations

Although GENELEC 1031A Monitoring System has been designed in accordance with international safety standards, this manual contains information, cautions and warnings which must be followed to ensure safe operation and to maintain 1031A Monitoring System in safe operation condition. Maintenance and adjustments should be performed only by a qualified service personnel.

Any adjustment, maintenance or repair of the opened 1031A Amplifier unit while the mains supply is connected should be avoided as far as possible, and when inevitable, should be carried out by a qualified person who is aware of the hazard involved.

**WARNING !**

*Any interruption of the protective ground conductor (inside or outside 1031A Amplifier Unit) or disconnection of the protective ground terminal is likely to make the instrument dangerous. intentional interruption of the protective ground conductor is strictly prohibited.*

It is possible for capacitors inside 1031A Amplifier Unit to still be charged even if the mains power supply is disconnected.

Ensure that only fuses with appropriate current rating and the specified type are used for replacement. Using repaired fuses or short-circuiting a fuse is strictly prohibited.

**WARNING !**

*The maintenance information presented in this manual is applicable with protective covers removed and mains power applied to 1031A Amplifier Unit. Energy available at many points may, if contacted, result in personnel injury.*

### 4.2 Servicing facilities

The test equipment required for servicing the 1031A Amplifier Unit is listed in table 3-1 in section 3 page 1.

## 4.3 Disassembly instructions

### 4.3.1 Removing the rear panel

- Disconnect the mains cable and input cable.
- Release the three screws marked 'A' in figure 4.1.
- Swing the rear panel outward.

### 4.3.2 Detaching the amplifier deck

- Disconnect the speaker cable from connector J3.
- Loosen the three screws marked 'B' in figure 4.1. and remove only the center one completely.
- Lift the amplifier slightly upwards and remove it from the enclosure.
- When assembling, reverse the above steps.

### 4.3.3 Detaching the circuit board

- Remove the deck from the enclosure (see steps above).
- Disconnect the transformer leads from connector J4 and XLR input jumper from connector J103 by pushing the connector locking collar near wires.
- Release the two screws marked 'C' in figure 4.1.
- Remove the amplifier circuit board by loosening the four nylon spacer going through holes on the board near corners.

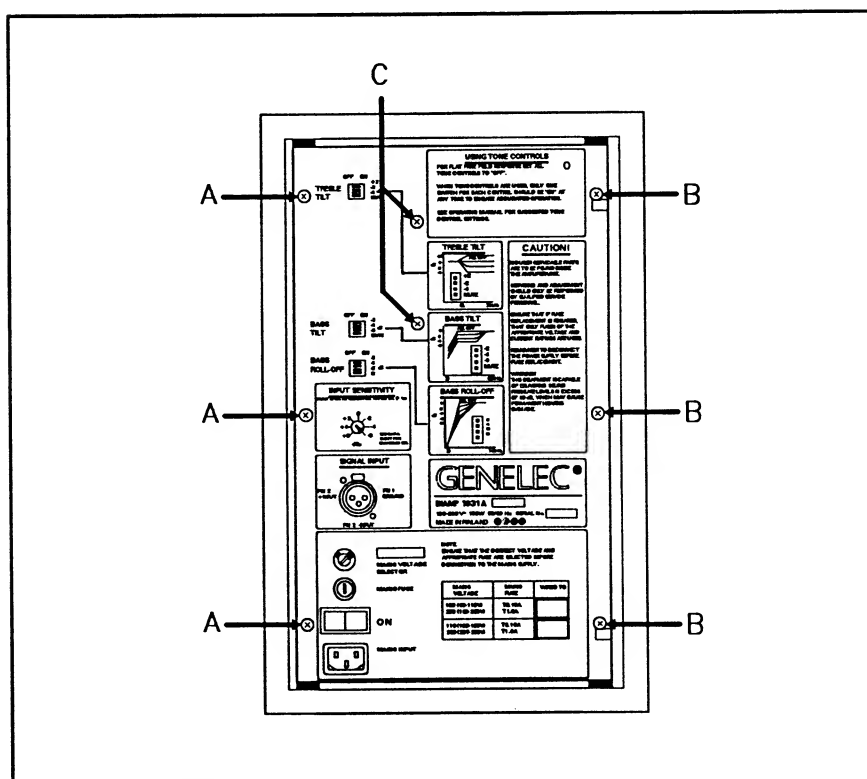


Figure 4.1 Location of rear panel fixing screws

## 4.4 Troubleshooting

Troubleshooting information on the 1031A Monitoring System incorporates voltage level values and notes included as part of the circuit diagrams and level diagrams. The curves in figure 4.2 show the frequency responses of crossover filter channels. The vertical scale shows directly the AC voltage gain of bass and treble channels, measured between the XLR-input connector and the test points on the crossover filter board.

Figure 4.3 shows the total voltage gain between XLR input connector and speaker output connector J3 for bass and treble channels. The location of test points is shown in Figure 4.4.

~~NOTE:~~ Note that the total voltage gain values shown in Figure 4.3 depend on the sensitivity of the driver elements, because the channel gain calibrating trimmers TR1, TR2 and TR3 affect the gain and they are set for flat acoustic response. However, the variation should not be more than a few decibels from the values presented.

When comparing the actual gain values to those shown, proceed as follows:

- a. Open the rear panel (see section 4.3.1).
- b. Disconnect the speaker cable from connector J3.
- c. Set the rear panel level control to CAL position (fully clockwise).
- d. Set all rear panel tone control switches (BASS ROLL-OFF, BASS TILT, TREBLE TILT) to OFF-positions.
- e. Switch the power on.

### 4.4.1 Checking crossover filter response

#### Bass channel

- Connect an audio generator to the XLR input connector. If unbalanced generator output is used make sure that XLR pin 1 and pin 3 are connected together and used as ground.
- Set the generator frequency to 1 kHz and output level to 100 mV (RMS).
- Measure the AC voltage levels at crossover filter test points TP6 ... TP9 (see Figure 4.4) at different bass frequencies between 20 Hz and 3 kHz and compare the results to the values read from the response curves in figure 4.2. If a dB scaled AC voltage meter is available the gain values can be read directly from meter scale after referencing the meter to input level of 100 mV RMS. Otherwise a simple calculation is needed (gain in dB =  $20 \times \log U_{\text{meas}}/0.1\text{V}$ ).

#### Treble channel

- Measure the AC voltage levels at the test points TP2 ... TP5 at different treble frequencies between 1 kHz and 20 kHz and compare the results to the values read from the response curves in figure 4.2.

#### 4.4.2 Checking the total voltage gain values

- Repeat steps above but use the main board test points TP5 (pin 2, bass out) and TP6 (pin 4, treble out) at power amplifier output connector J3. Compare the results to the values read from the response curves in figure 4.3. Be sure that no load is connected to the speaker connector during measurement. Because of negative output impedance used in bass amplifier output, the voltage gain depends on the load impedance.

#### 4.4.3 Voltage gain adjustment procedure

If the shape of channel response curves are right but the gain level is wrong, it is possible that the channel gain calibrating trimmer positions have been changed. It is possible to 'coarse' calibrate the channel gains by adjusting the channel voltage gain to average value. The calibrating is not exact because it does not observe driver sensitivity variations.

- Repeat steps (a) to (e) above.

#### Bass channel

- Set the generator frequency to 1 kHz and the generator output level to 100 mV (RMS).
- Measure the AC voltage level at the output connector J3 across pin 2 (bass out) and ground. Adjust the AC output voltage to 1.58 V (RMS) by trimmer TR3 (B-CAL) located on the crossover filter board. This is a voltage gain of 24 dB.

#### Treble channel

- Change the generator frequency to 10 kHz. Set trimmer TR1 (EHF-CAL) to center position.
- Measure the AC voltage level at the output connector J3 over pin 4 (treble out) and ground. Adjust the AC output voltage to 2 V (RMS) by trimmer TR2 (T-CAL) located on the crossover filter board. This is a voltage gain of 26 dB.

The calibration process is now completed.

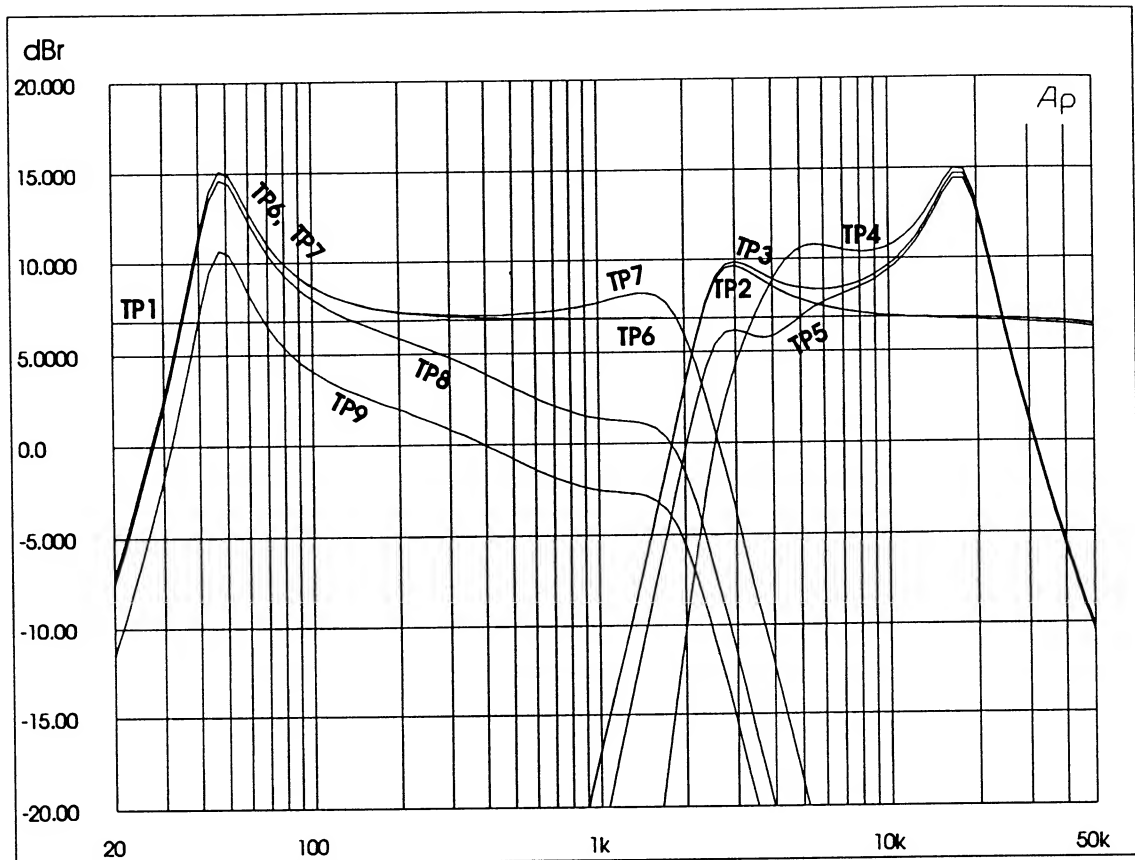


Figure 4.2 Crossover filter response curves

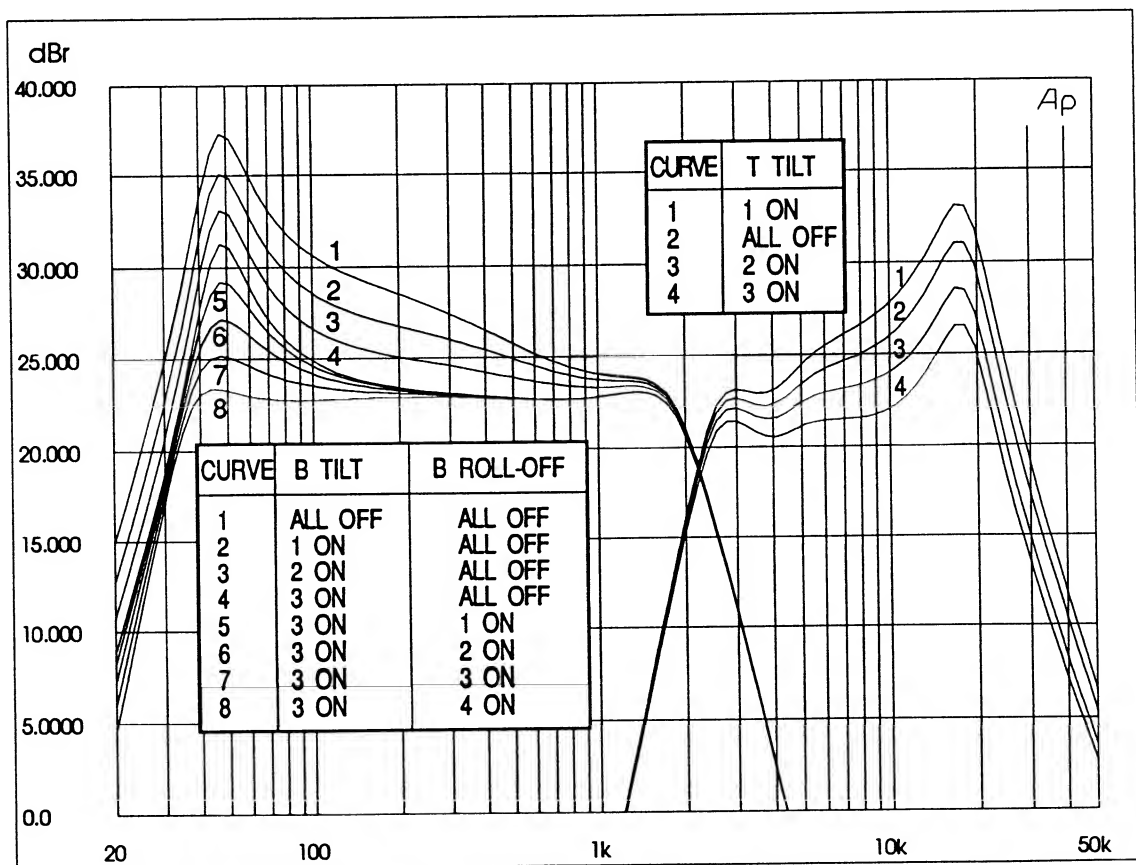


Figure 4.3 Total voltage gain curves and the effect of the crossover controls

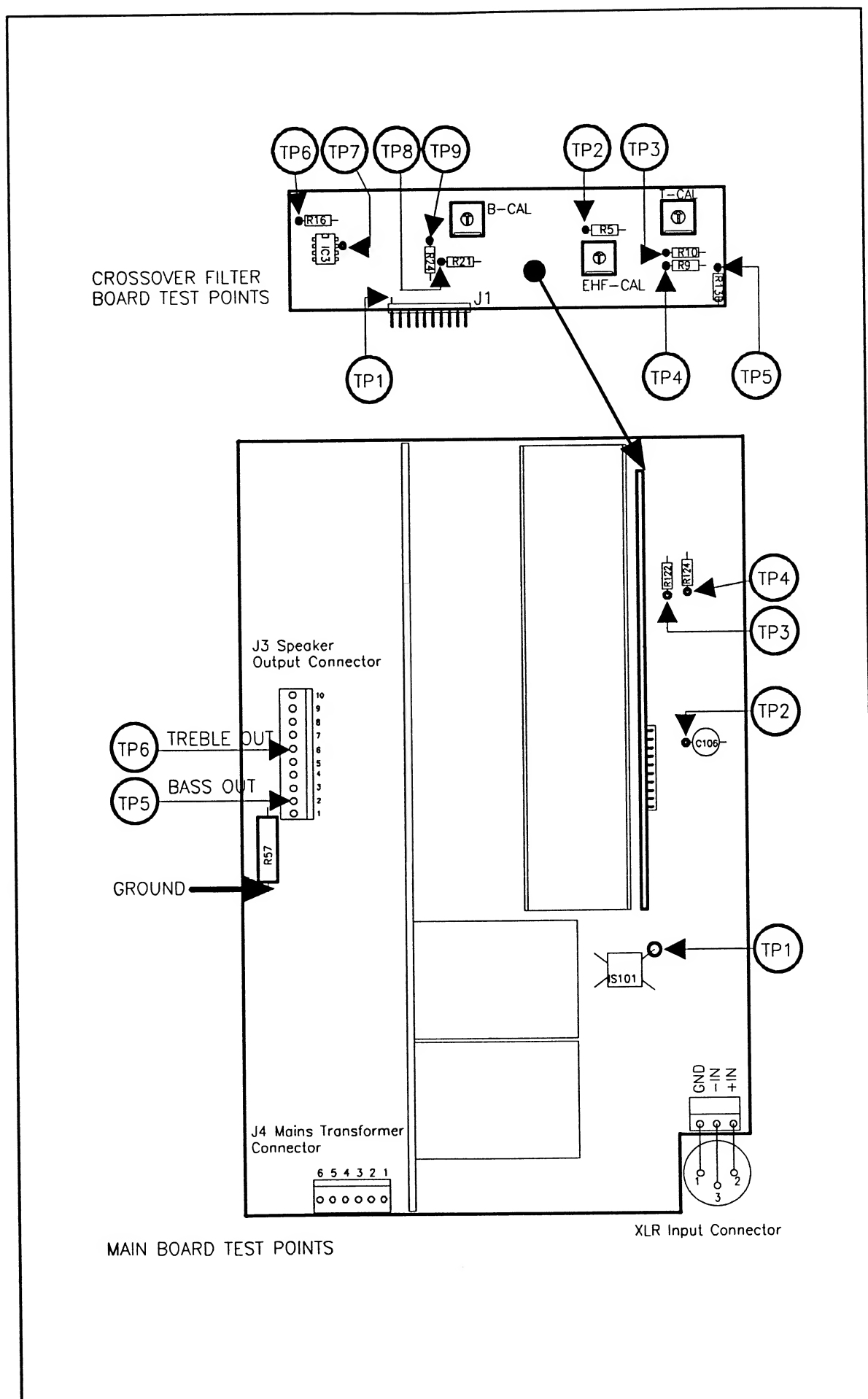


Figure 4.4 The location of test points

#### 4.4.4 Checking the protection circuits

- a. Open the rear panel (see section 4.3.1).
- b. Disconnect the speaker cable from connector J3.
- c. Set the level control on the rear panel to CAL positions (fully clockwise).
- d. Set all rear panel tone control switches (BASS ROLL-OFF, BASS TILT, TREBLE TILT) to OFF-positions.
- e. Connect an audio generator to the XLR input connector. If unbalanced generator output is used make sure that XLR pin 1 and pin 3 are connected together and used as ground.
- f. Switch the power on.

##### Bass channel

- Set the generator frequency to 1 kHz and output level to 100 mV (RMS).
- Measure the voltage level at the bass power amplifier output (test point TP5 in figure 4.4) with an oscilloscope or RMS voltage meter. Slowly increase the generator output level and see that the power amplifier output level increases accordingly up to 15 V RMS. This corresponds a generator level of 1 V (RMS). Raise the generator level to 2 V (RMS), which corresponds the clipping level of bass power amplifier, and note that the output level does not exceed 15.5 V (RMS).

##### Treble channel

- Change the generator output level to 100 mV (RMS) and frequency to 10 kHz.
- Measure the voltage level at the treble power amplifier output (test point TP6 in figure 4.4) with an oscilloscope or RMS voltage meter. Slowly increase the generator output level and see that the power amplifier output level increases accordingly up to 4.5 V RMS. This corresponds a generator level of 230 mV (RMS). Raise the generator level to 1.5 V (RMS), which corresponds the clipping level of treble power amplifier, and note that the output level does not exceed 5 V (RMS).

Note that the measurement is done with constant sine wave signal. With actual music or speech signals the output voltage of mid and treble amplifiers is allowed to go to clipping level as far as the thermal capacity of speaker drivers is not exceeded.

#### 4.4.5 Changing the Power Amplifier Driver Board

- Remove the main circuit board from the amplifier unit (see Section 4.3.3).
- Unsolder connector J1, or J2 (bass or treble) depending on which channel PA-driver board is to be removed.
- Remove the PA-Driver board involved carefully by lifting it upwards.
- Push new PA-driver Board into connector holes and resolder.
- After assembling the amplifier check the offset voltage and bias current as shown in sections 3.3.1 - 3.3.2.

#### 4.4.6 Changing the Power Transistors

The power transistors are mounted to the cooling plate with the aid of U-bracket and aluminum bar. The power transistors are compressed between the bracket and the bar with two M4x20 mm screws which also mount the amplifier board to the back plate. It is only necessary to remove these screws and one M3x12 mm screw inside the bracket to see the transistors. See the exploded view (Fig.6.11) for details.

The power transistor usually is shorted after failure. The transistor can be checked with an ohm-meter by measuring the resistance between emitter and collector wires. With good transistor the measuring value is high. If the meter shows low resistance (0-10 ohms) the transistor is probably faulty. Remove the transistor and recheck the resistance. Most Digital Ohm Meters also measure the diode junction voltage (forward biased) with constant current. With good transistor this value should be around 500 mV in base-emitter and base-collector diodes.

If replacement is required always change both of the PNP-NPN pair. Also check the driver transistor pair by measuring them respectively.

To remove the power transistors proceed as follows:

- remove the main circuit board from the amplifier unit (see Section 4.3.3).
- remove the driver transistor mounting springs from the side wall of the U-bracket by compressing the spring inside the bracket.
- remove the crossover filter mounting screws on other side of the bracket.
- remove the M3 screws inside the bracket and lift the bracket off from the board. The transistors can now be replaced.
- When assembling mount all washers in original locations. Note that the circuit board is grounded to the chassis via the top M3 screw, and the washer between PCB and aluminum bar for this screw must not be removed.

## 5. Spare parts

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### 5.1 Ordering Information

Most of the electronic components used in 1031A Monitoring System are commercially available by local distributors. However, because of the high standard of 1031A specifications, there are components which are specified by GENELEC and thus available only from there. The use of GENELEC order code will make the order processing faster and help minimizing the delivery mistakes.

When ordering a spare driver unit it is extremely important to add the serial No of the 1031A under repair in the order form. To maintain the acoustical specifications of 1031A, in some cases the channel gain alignment is needed when an element is replaced.

### 5.2 Recommended Spare Parts Stock

To make the on site maintenance and workshop troubleshooting of 1031A Monitoring System quick and efficient the following stock of spare units is recommended.

<u>Qty</u>	<u>Part Code</u>	<u>Description</u>
<i>MODULES</i>		
1	1031-300	Amplifier Unit
2	1035-311	Power Amplifier Driver Module
<i>COMPONENTS</i>		
5	142-3298	2SC3298B Driver Transistor NPN
5	143-1306	2SA1306B Driver Transistor PNP
5	142-3281	2SC3281 Power Transistor NPN
10	143-1302	2SA1302 Power Transistor PNP
20	181-0315	Fuse T315mA Slow Blow
20	181-1600	Fuse T1.6A Slow Blow
20	180-2500	Fuse F2.5A Fast Blow
1	320-1400	Mains switch

<u>Qty</u>	<u>Part Code</u>	<u>Description</u>
<i>SPEAKER ENCLOSURE</i>		
1	342-3102	Bass Driver (new type) fixed with 6 screws used from S/N 3000
	342-3101	Bass Driver (old type) fixed with 4 screws used below S/N 2999
1	340-3101	Treble Driver

For component level spare parts refer to spare parts lists in the following pages.

# 1031-300 1031A Amplifier, Parts List

Ref	Part Code	Description
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## Capacitors, 100 V unless otherwise noted

C1	126-5100	10U/25V Tantal
C2	120-1100	1N Ceramic
C3	120-0048	47P/500V Ceramic
C4	120-0048	47P/500V Ceramic
C5	122-3101	100N Polyester
C6	122-3101	100N Polyester
C7	126-5100	10U/25V Tantal
C8	120-1100	1N Ceramic
C9	120-0048	47P/500V Ceramic
C10	120-0048	47P/500V Ceramic
C11	122-3101	100N Polyester
C12	122-3101	100N Polyester
C13	126-3100	1U/35V Tantal
C14	126-5100	10U/25V Tantal
C15	126-3100	1U/35V Tantal
C16	126-5100	10U/25V Tantal
C17	126-5100	10U/25V Tantal
C18	126-4100	1U/35V Tantal
C19	128-7101	1000U/35V Electrolytic
C20	122-3101	100N Polyester
C21	120-2100	10N Ceramic
C22	120-2100	10N Ceramic
C23	120-2100	10N Ceramic
C24	120-2100	10N Ceramic
C25	128-7101	1000U/35V Electrolytic
C26	128-7101	1000U/35V Electrolytic
C27	126-5100	10U/25V Tantal
C28	126-5100	10U/25V Tantal
C29	126-5100	10U/25V Tantal
C30	126-5100	10U/25V Tantal
C31	122-5150	15U/100V Polyester
C32	120-2100	10N Ceramic
C33	122-4100	1U/50V Polyester
C101	120-0100	100P Ceramic
C102	120-0100	100P Ceramic
C103	125-1470	4N7 Polypropylene
C104	125-1680	6N8 Polypropylene
C105	126-5100	10U/25V Tantal
C106	126-5100	10U/25V Tantal
C107	122-3221	220N Polyester
C108	125-1220	2N2 Polypropylene
C109	125-1150	1N5 Polypropylene
C110	125-1680	6N8 Polypropylene
C111	125-1330	3N3 Polypropylene
C112	125-1470	4N7 Polypropylene
C201	128-8163	10000U/63V Electrolytic
C202	128-8163	10000U/63V Electrolytic

Ref	Part Code	Description
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C203	122-3101	100N Polyester
C204	122-3101	100N Polyester
C205	122-3101	100N Polyester
C206	122-3101	100N Polyester
C301	124-4010	100N/250VAC

## Connectors

J301	316-0002	Mains Connector
XLR1	312-0002	Input Connector, XLR
J103	314-0310	Input Connector, PCB
J3	313-2421	Output Connector, 10 pin
J4	313-2423	AC Connector

## Diodes

D1	161-4004	1N4004
D2	161-4004	1N4004
D3	161-4004	1N4004
D4	161-4004	1N4004
D5	161-4148	1N4148
D6	161-4148	1N4148
D7	161-4148	1N4148
D8	161-4148	1N4148
D9	161-4148	1N4148
D10	161-4004	1N4004
D11	161-4004	1N4004
D12	161-4004	1N4004

BR1	162-8517	W02
BR201	162-0602	KBPC602

LED1	164-5000	LED Green 5 mm
LED2	164-5001	LED Red 5 mm

## Fuses

F1	181-0315	T315mA Slow Blow
F2	181-0315	T315mA Slow Blow
F201	180-2500	F2.5A Fast Blow
F202	180-2500	F2.5A Fast Blow
F203	180-2500	F2.5A Fast Blow
F204	180-2500	F2.5A Fast Blow
F301	181-1600	T1.6A Slow Blow (200/230VAC Mains)
F301	181-3150	T3.15A Slow Blow (100/115VAC Mains)
	360-0001	Rear Panel Fuse Holder
	361-0001	PCB Fuse Holder

## Integrated Circuits

IC1	150-0072	TL072
IC2	150-0339	LM339
IC3	150-0072	TL072
IC4	154-7815	MC7815
IC5	155-7915	MC7915

# 1031-300 1031A Amplifier, Parts List

Ref	Part Code	Description	Ref	Part Code	Description
IS101	150-0530	VTL 5C3	R20	113-2103	10 3W Carbon Film
<b>Switches</b>			R21	111-5100	10K0
K301	320-1400	Mains Switch	R22	111-5100	10K0
K302	329-0001	Mains Voltage Selector	R23	111-4301	3K01
SW101	324-0004	DIP Switch	R24	111-5187	18K7
SW102	324-0004	DIP Switch	R25	111-5402	40K2
SW103	324-0004	DIP Switch	R26	111-5402	40K2
<b>Coils</b>			R27	111-6205	205K
L1	190-0101	Output Inductance	R28	111-4100	1K00
L2	190-0101	Output Inductance	R29	111-5100	10K0
<b>Transistors</b>			R30	111-4464	4K64
T1	144-0014	MPSA14 NPN-Darlington	R31	111-6100	100K
T2	142-3298	2SC3298B-Y	R32	111-5100	10K
T3	143-1306	2SA1306B-Y	R33	111-5100	10K
T4	142-3281	2SC3281-O	R34	110-3100	100 0.25W Flame Proof
T5	143-1302	2SA1302-O	R35	111-5162	16K2
T6	144-0014	MPSA14 NPN-Darlington	R36	111-5100	10K
T7	142-3298	2SC3298B-Y	R37	111-6681	681K
T8	143-1306	2SA1306B-Y	R39	111-7120	1M2 Carbon Film
T9	142-3281	2SC3281-O	R40	111-5100	10K
T10	143-1302	2SA1302-O	R41	111-6100	100k
T11	140-0546	BC546B	R42	111-5100	10K
T12	141-0556	BC556B	R43	111-3750	750
T13	141-0556	BC556B	R44	111-5100	10K
T101	140-0546	BC546B	R45	111-5100	10K
T102	140-0546	BC546B	R46	111-6100	100K
<b>Resistors, Metal Film 0.6W 1% unless otherwise noted</b>			R47	111-4205	2K05
R1	110-4150	1K5 0.25W Flame Proof	R48	111-4100	1K00
R2	110-4180	1K8 0.25W Flame Proof	R49	110-6100	100K
R3	110-2470	47 0.25W Flame Proof	R50	111-5100	10K0
R4	110-2470	47 0.25W Flame Proof	R51	111-5681	46K4
R5	110-3100	100 0.25W Flame Proof	R52	111-5100	10K0
R6	116-0330	0.33 4W Wire Wound	R53	111-5100	10K0
R7	116-0330	0.33 4W Wire Wound	R54	111-5100	10K0
R8	113-2103	10 3W Carbon Film	R55	111-5100	10K0
R9	113-2103	10 3W Carbon Film	R56	111-5100	10K0
R10	111-5100	10K0	R57	116-0150	0.15 4W Wire Wound
R11	111-5100	10K0	R58	111-2274	27R4
R12	110-4150	1K5 0.25W Flame Proof	R59	111-5464	46K4
R13	110-4180	1K8 0.25W Flame Proof	R60	111-4100	1K00
R14	110-2470	47 0.25W Flame Proof	R101	111-4464	4K64
R15	110-2470	47 0.25W Flame Proof	R102	111-4464	4K64
R16	110-3100	100 0.25W Flame Proof	R103	111-4464	4K64
R17	116-0330	0.33 4W Wire Wound	R104	111-4464	4K64
R18	116-0330	0.33 4W Wire Wound	R105	111-4464	4K64
R19	113-2103	10 3W Carbon Film	R106	111-4464	4K64
			R107	111-5100	10K0
			R108	111-5100	10K0

## 1031-300 1031A Amplifier, Parts List

Ref	Part Code	Description
R109	111-4383	3K83
R110	111-5226	22K6
R111	111-5464	46K4
R112	111-5825	82K5
R113	111-5365	36K5
R114	111-5215	21K5
R115	111-5147	14K7
R116	111-4205	2K05
R117	111-5402	40K2
R118	111-6140	140K
R119	111-6649	64K9
R120	111-5402	40K2
R121	111-4681	6K81
R122	111-4154	1K54
R123	111-3464	464
R124	111-4100	1K00
R125	111-4464	4K64
R126	111-4464	4K64
R127	111-5402	40K2
R128	111-4205	2K05
R129	111-4100	1K00
R201	111-5100	10K0
R202	111-5100	10K0
R301	113-2100	10 1/2W Carbon Film
PTC1	179-0070	
<b>Trimmer Potentiometers, Cermet</b>		
P1	172-5100	Cermet Trimmer
TR1	173-3500	Cermet Trimmer
TR2	173-3500	Cermet Trimmer
<b>Transformers</b>		
M301	100-3101	Mains Transformer toroidal 100/115/200/230V Primary
	100-3102	Mains Transformer C-ring 100/115/200/230V Primary
<b>Zener Diodes</b>		
ZD1	163-7905	BZX79C5V6
<b>Miscellaneous</b>		
	237-0001	PCB spacer
	243-3101	Silicon insulator 1
	243-3102	Silicon insulator 2
	272-3101	Rear Panel
	273-3101	Power Transistor Bar
	273-3102	U-Bracket

## 1031-303 Crossover Filter, Parts List

Ref	Part Code	Description
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### Capacitors, Polypropylene 2.5% unless otherwise noted

C401	125-2100	10N
C402	125-2100	10N
C403	125-1100	1N
C404	125-1100	1N
C405	125-1470	4N7
C406	125-0150	150P
C407	125-1100	1N
C408	125-1100	1N
C409	122-3221	220N Polyester
C410	122-3221	220N Polyester

C411	122-3221	220N Polyester
C412	122-3221	220N Polyester
C413	125-1470	4N7
C413B	125-1330	3N3
C414	125-1680	6N8
C415	125-1220	2N2
C416	125-0220	220P
C417	122-4100	1U Polyester
C418	126-5100	10U/25V Tantal
C419	126-5100	10U/25V Tantal
C420	120-2100	10N Ceramic
C421	120-2100	10N Ceramic

### Resistors, Metal Film 1%

R401	111-5162	16K2
R402	111-5110	11K0
R403	111-5205	20K5
R404	111-6274	274K
R405	111-5100	10K0
R406	111-5100	10K0
R407	111-5140	14K0
R408	111-5866	86K6
R409	111-5332	33K2
R410	111-4909	9K09

R411	111-4464	4K64
R412	111-4464	4K64
R413	111-1000	OR
R413B	111-5100	10K0
R414	111-4187	1K87
R415	111-6274	274K
R416	111-4825	8K25
R417	111-4825	8K25
R418	111-5825	82K5
R419	111-5825	82K5
R420	111-7100	1M00

R421	111-5100	10K0
R422	111-4464	4K64
R423	111-4464	4K64

Ref	Part Code	Description
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R424	111-4100	1K00
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### Trimmer Potentiometers, Cermet

TR401	173-5100	10K
TR402	173-5100	10K
TR403	173-5100	10K

### Integrated Circuits

IC401	150-5532	NE5532
IC402	150-0072	TL072
IC403	150-0072	TL072
IC404	150-0072	TL072

### Connectors

314-4455	PCB Connector 10-pin
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**1031-200 1031A Loudspeaker Enclosure, Parts List**

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Ref	Part Code	Description
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**Driver Units**

	340-3101	Treble Driver
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	342-3101	Bass Driver (old type) S/N 1-2999
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	342-3102	Bass Driver (new type) S/N 3000 -
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**Miscellaneous**

	240-0102	Bass Driver Gasket
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	206-4025	Driver Fixing Screw M4X25 Black
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	270-1520	Amplifier Mounting Rubber
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	273-3103	Amplifier Mounting Bracket
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	292-3101	GENELEC Sticker
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	292-3102	LED Sticker
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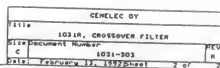
Ref	Part Code	Description
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## 6. Drawings

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**Figure 6.2 1031A Crossover network, circuit diagram , Rev A**

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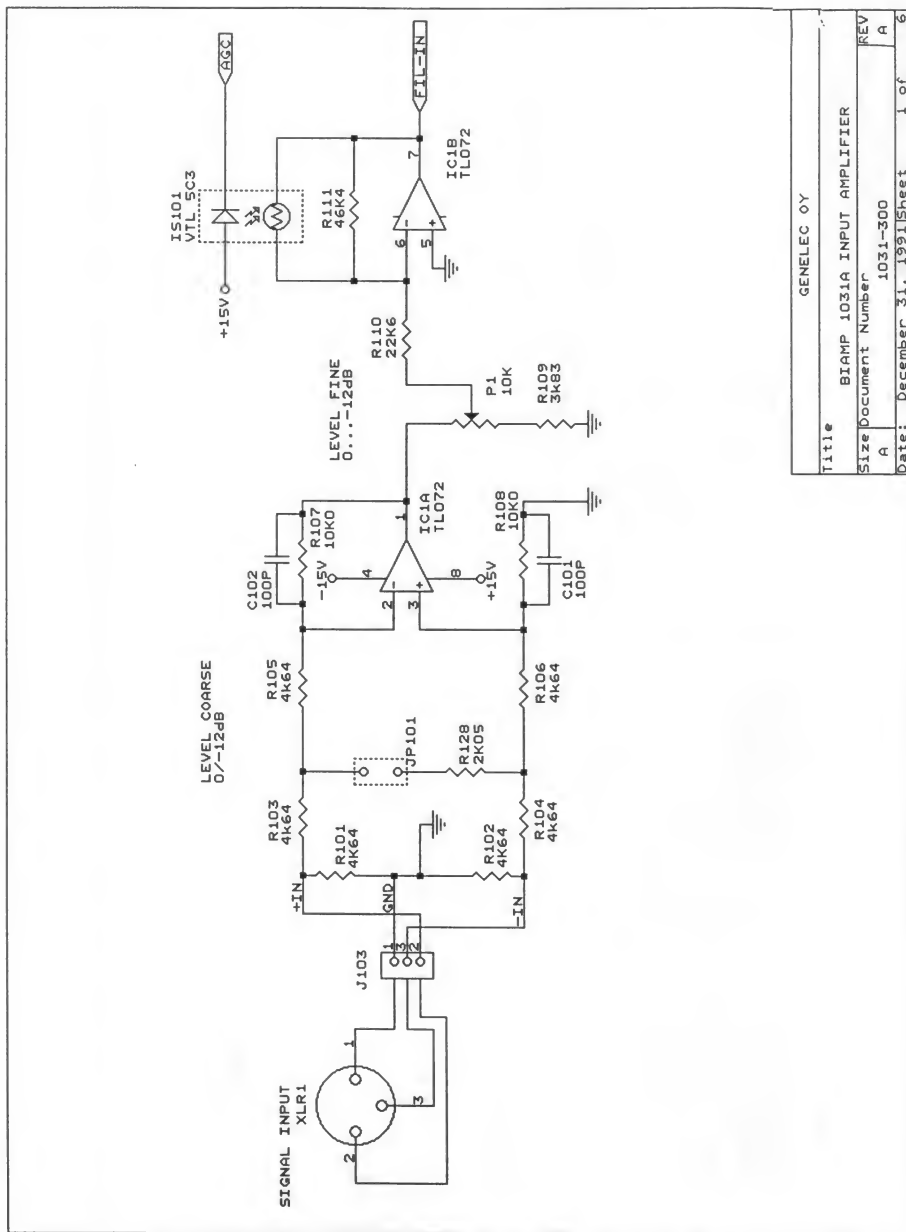


Figure 6.5 Input amplifier, circuit diagram

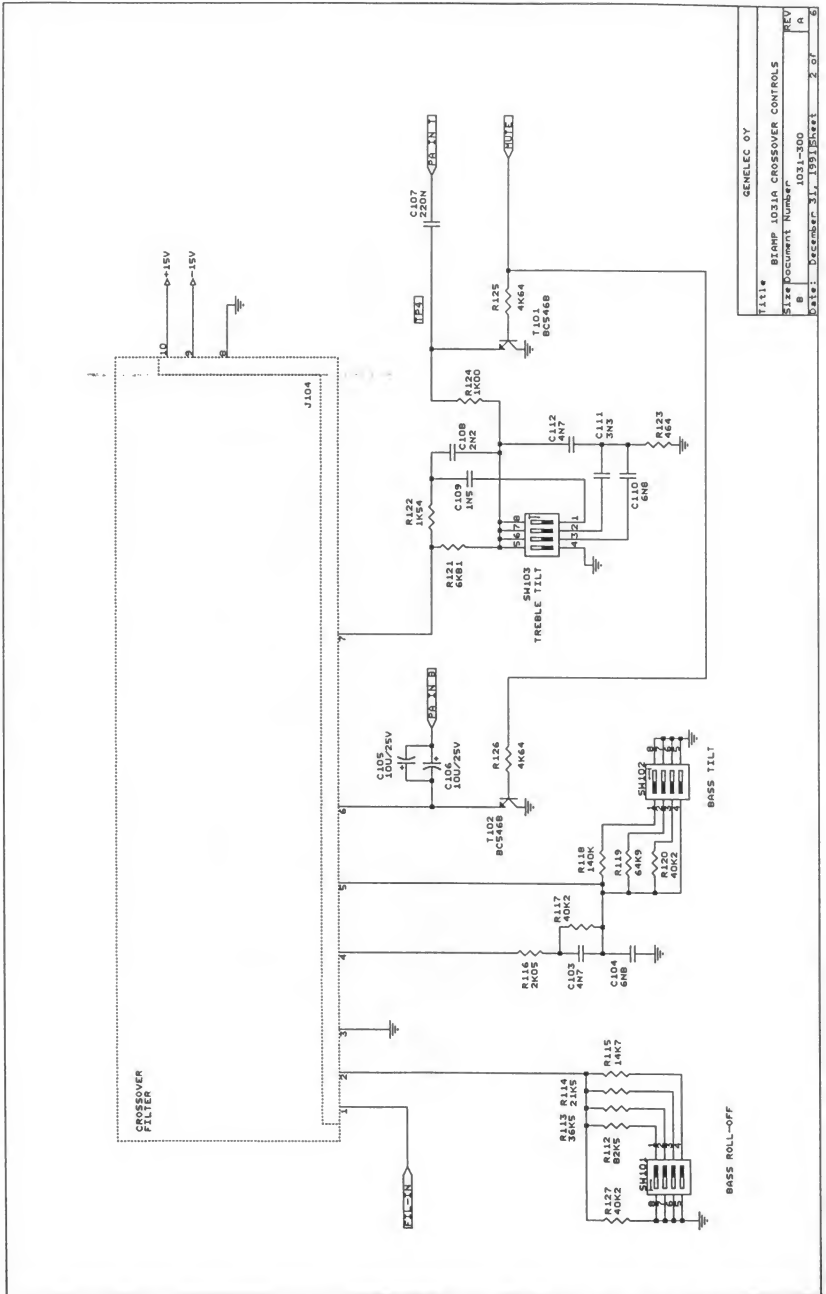
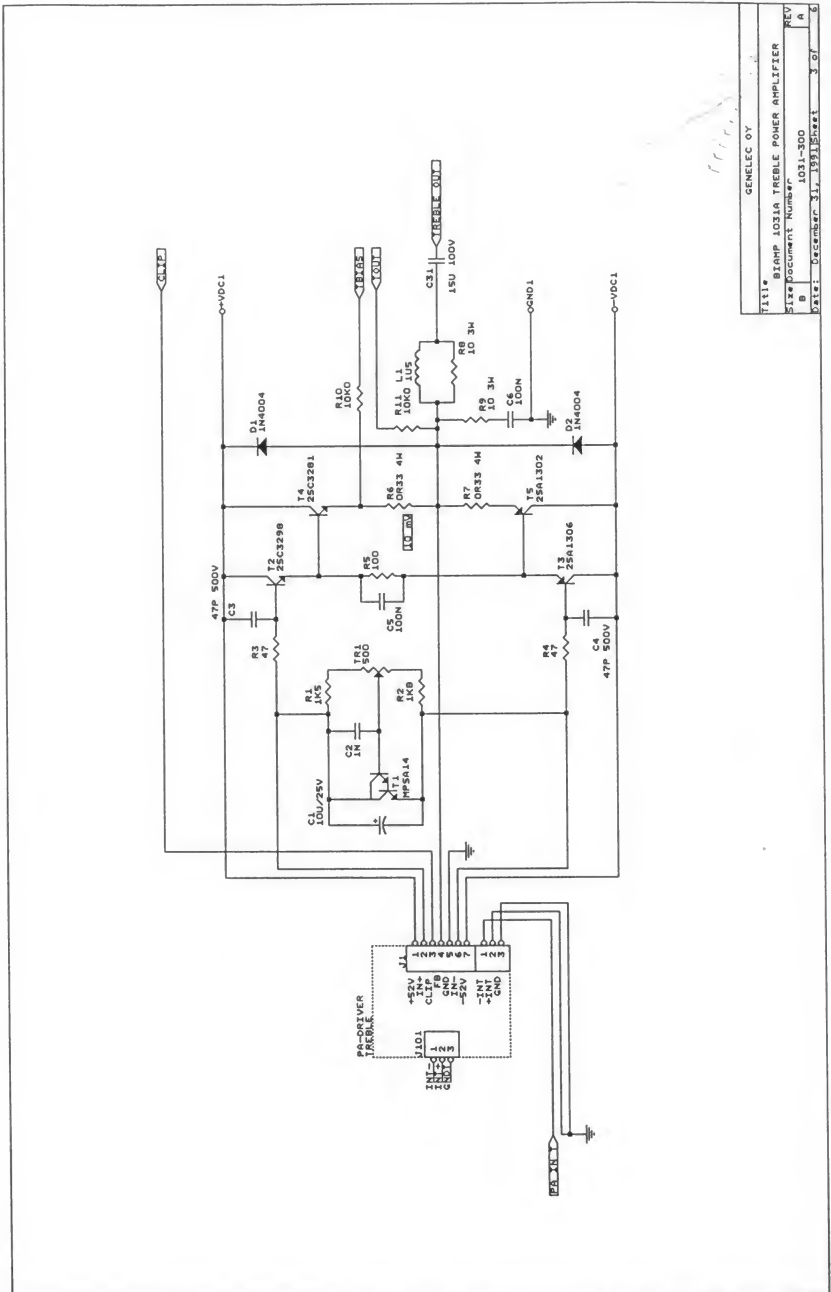
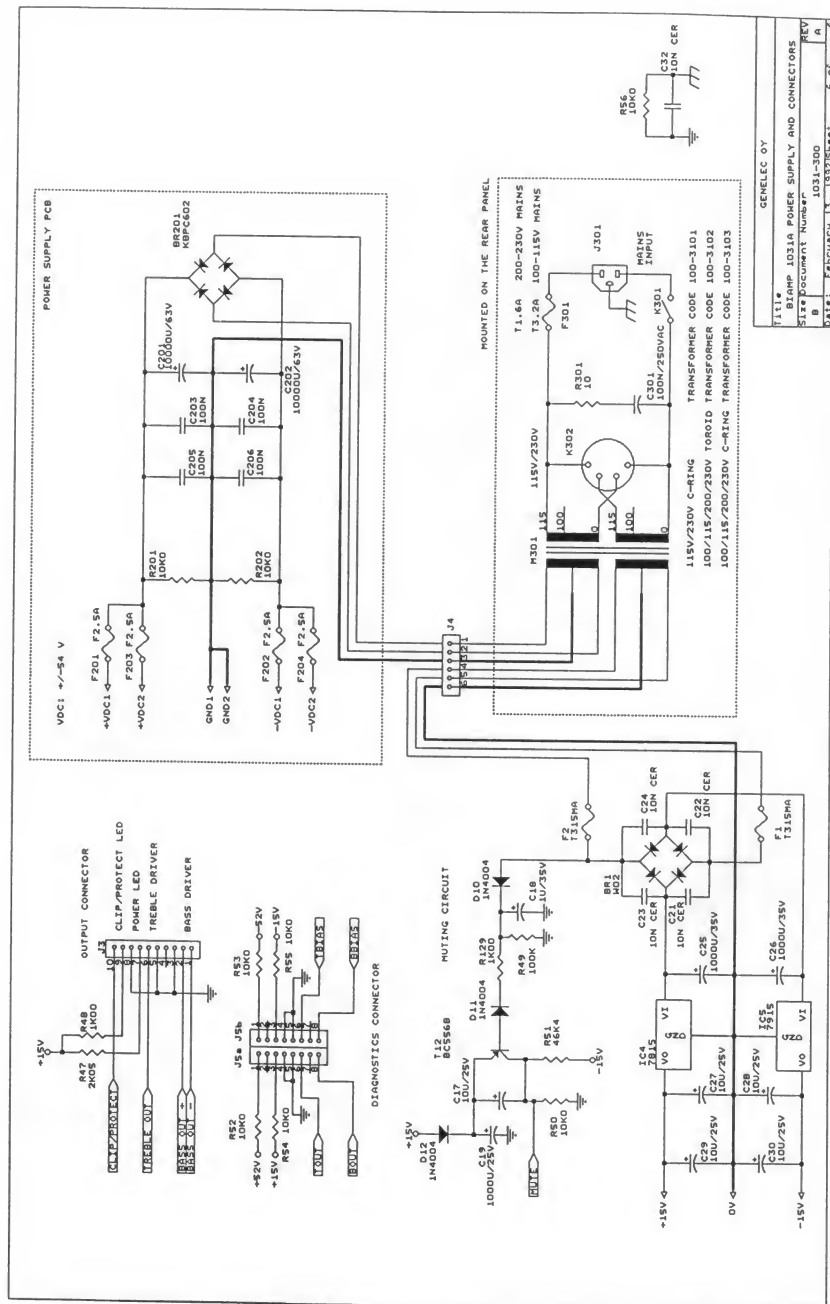


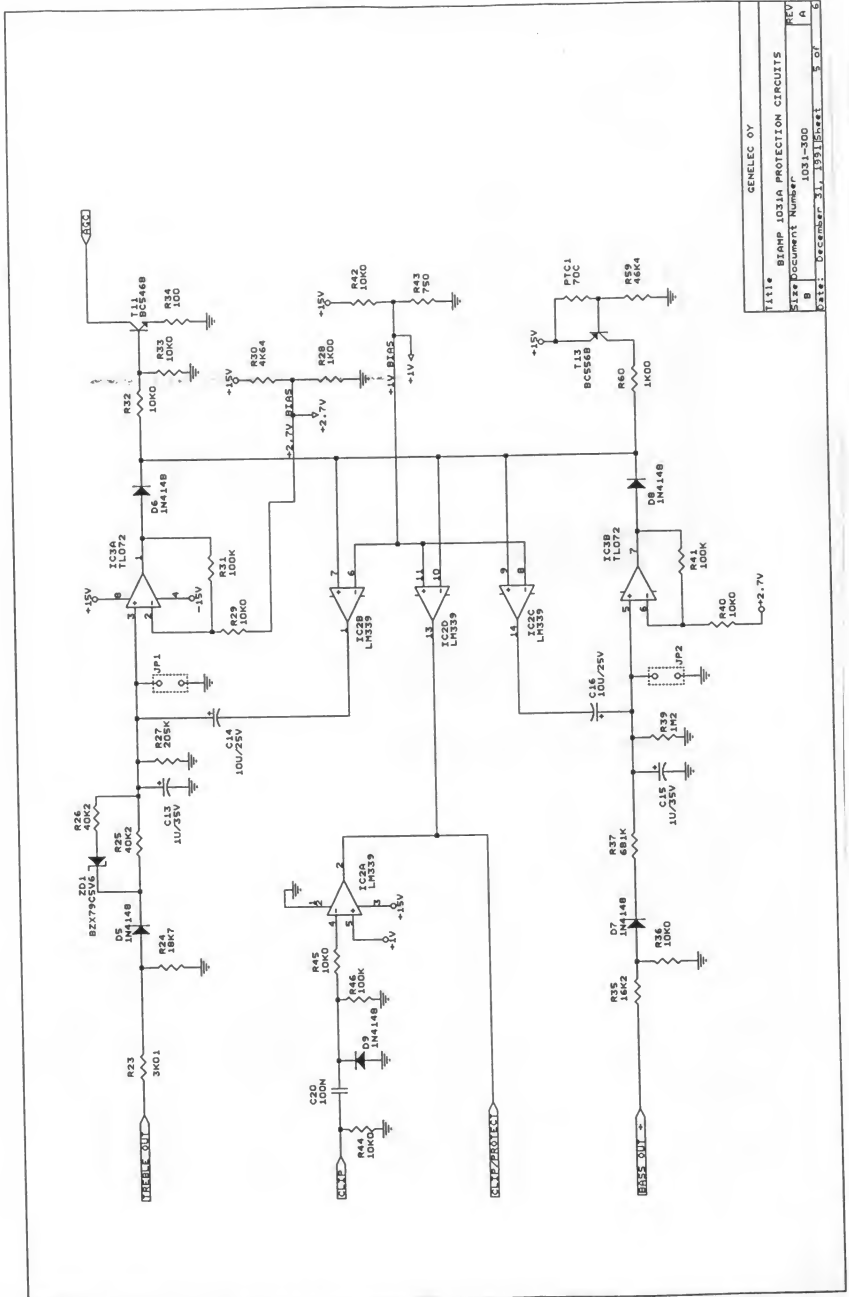
Figure 6.6 Crossover controls, circuit diagram



**Figure 6.7** Treble power amplifier, circuit diagram



**Figure 6.10** Power supply and connectors, circuit diagram



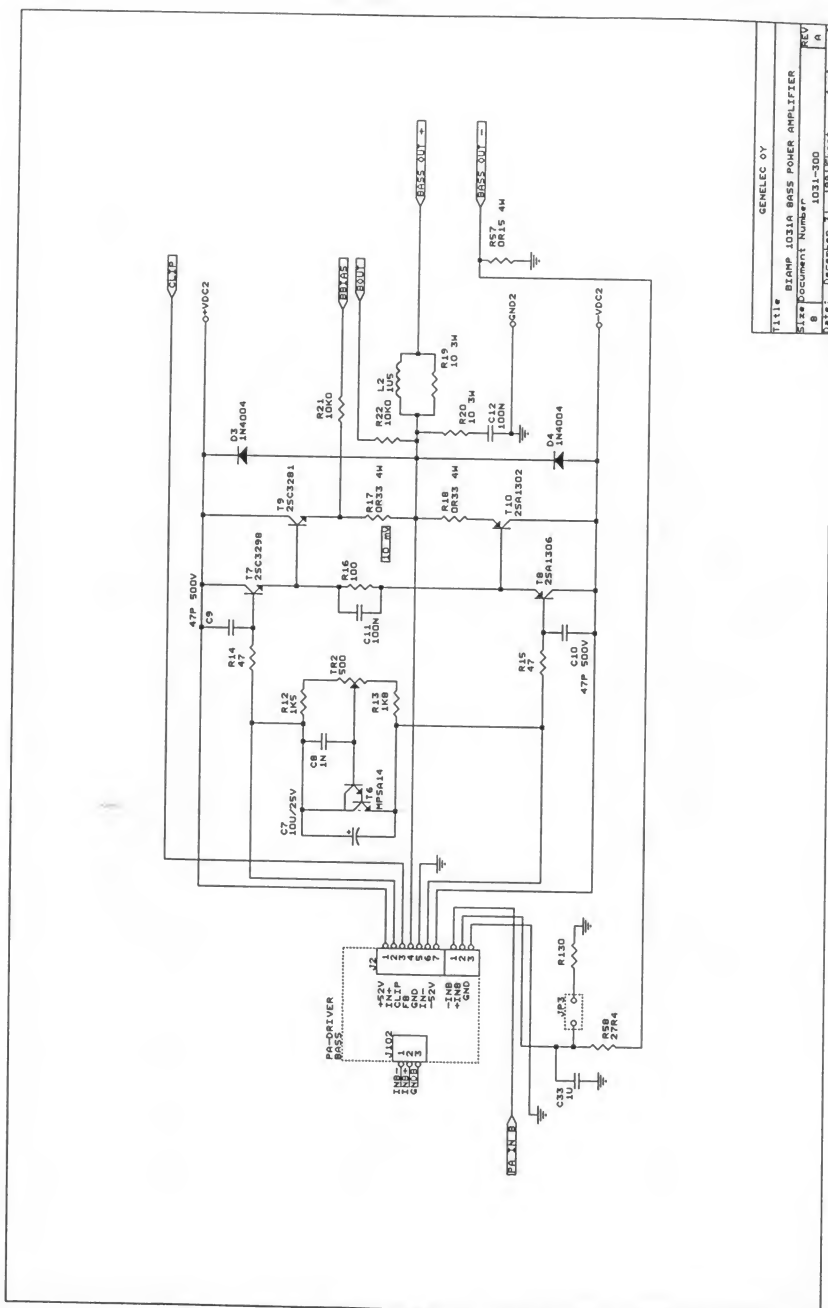
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BIAMP 1031A PROTECTION CIRCUITS

Size: 1001-1000

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Figure 6.9 Protection circuits and LED driver, circuit diagram



File	GENELEC 01
Title	BIAMP 10310 BASS POWER AMPLIFIER
Size	Document Number
8	1031-300
REV	A
Date	December 31, 1991
Drawn	1
Checked	2

Figure 6.8 Bass power amplifier, circuit diagram

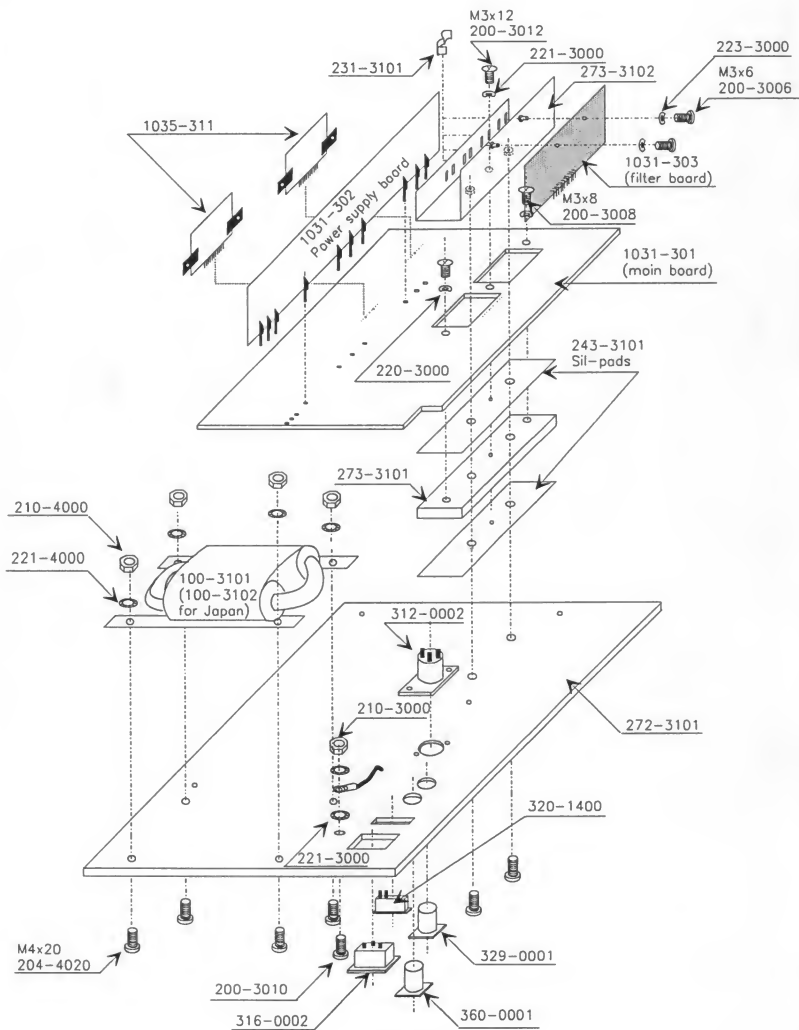


Figure 6.11 Exploded view of amplifier construction

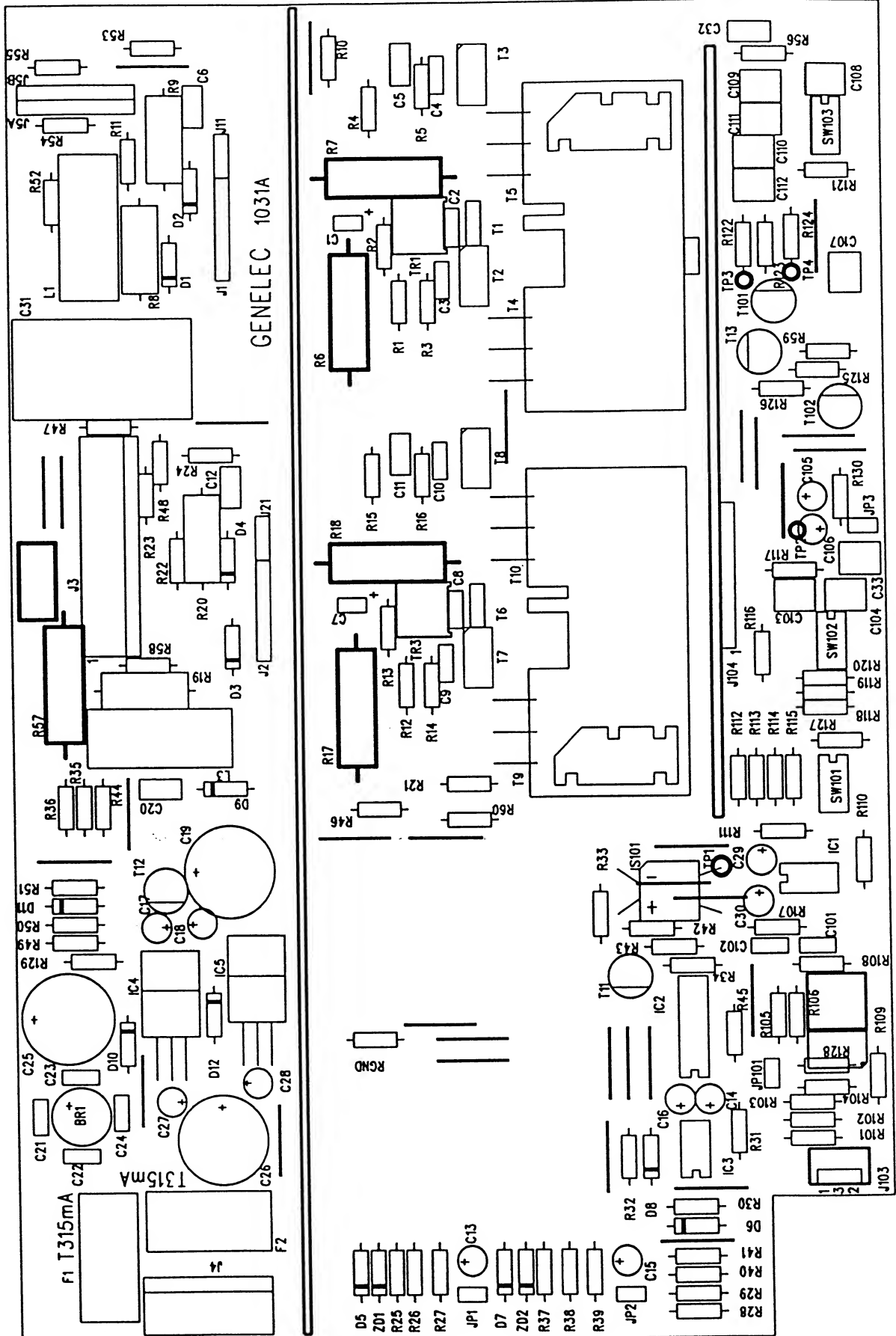


Figure 6.3 1031A Main board, component layout, Rev A

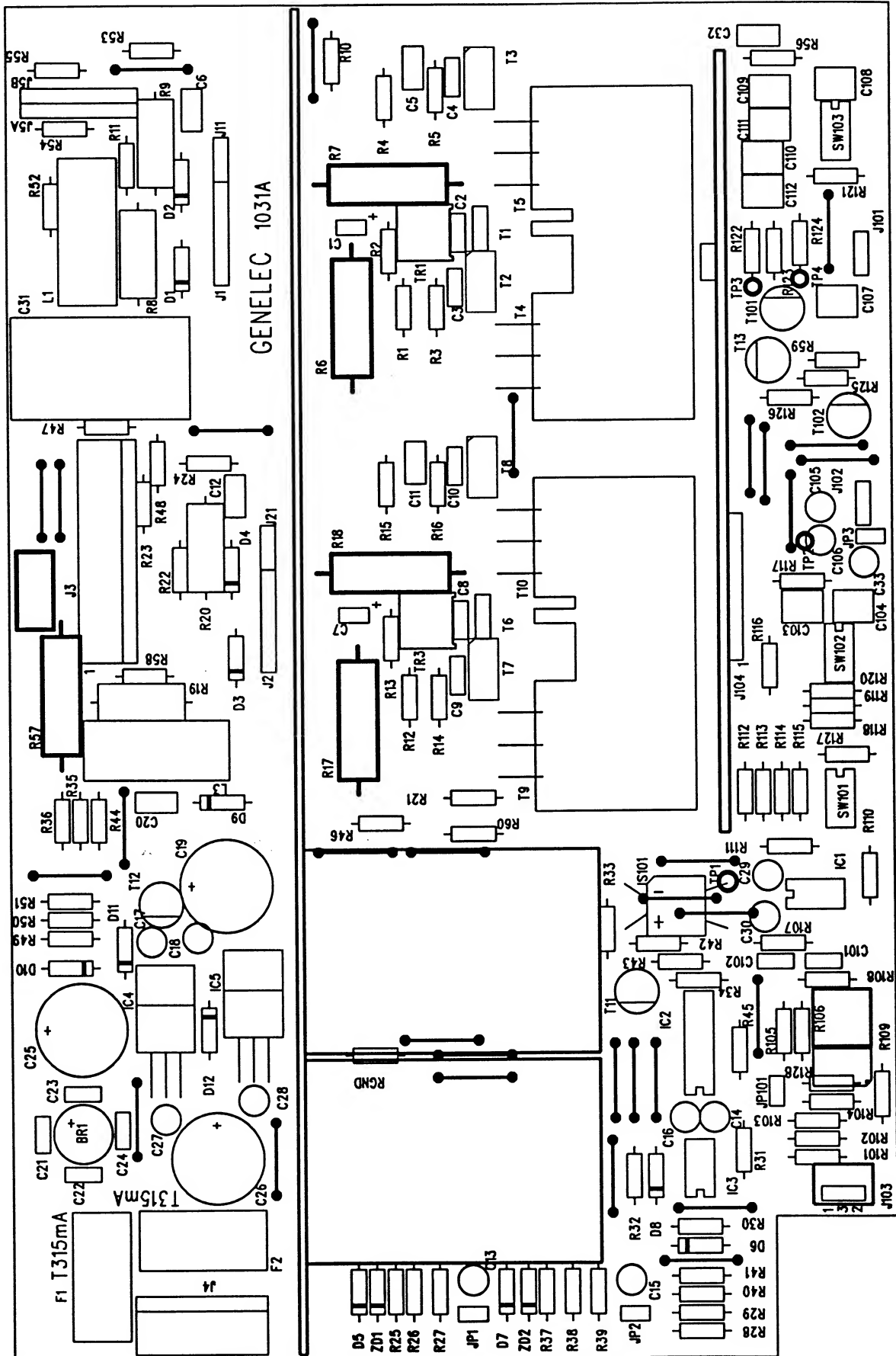


Figure 6.3 1031A Main board, component layout

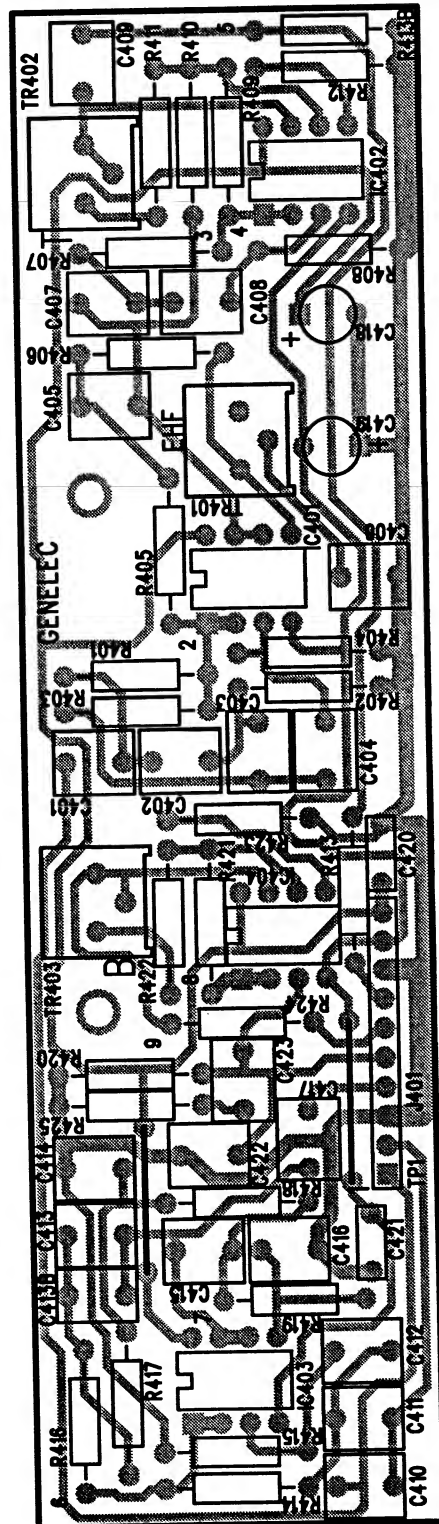


Figure 6.4 1031A Crossover filter, component layout, Rev B

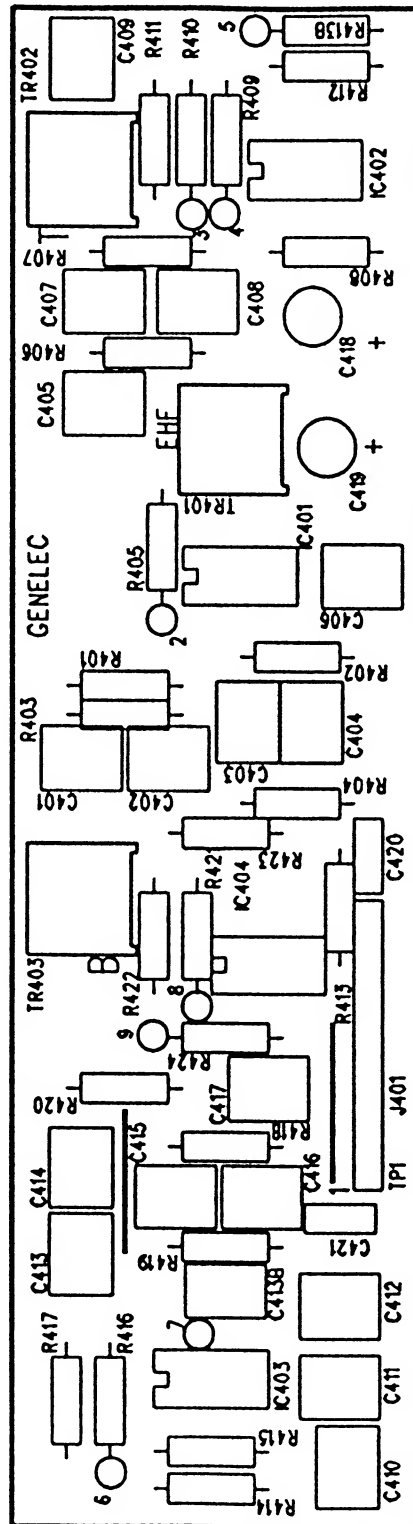


Figure 6.4 1031A Crossover filter, component layout, Rev A

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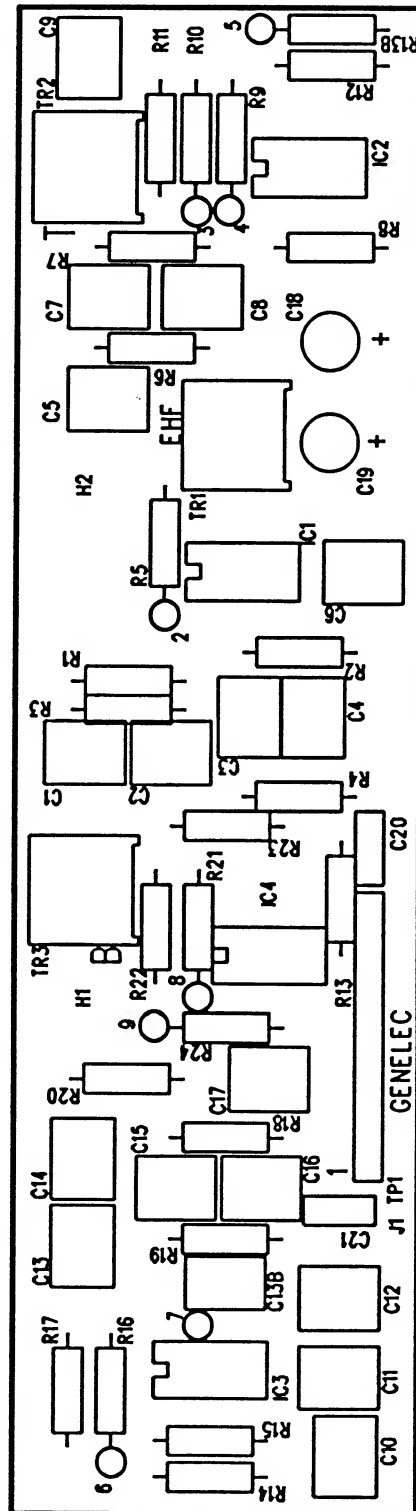


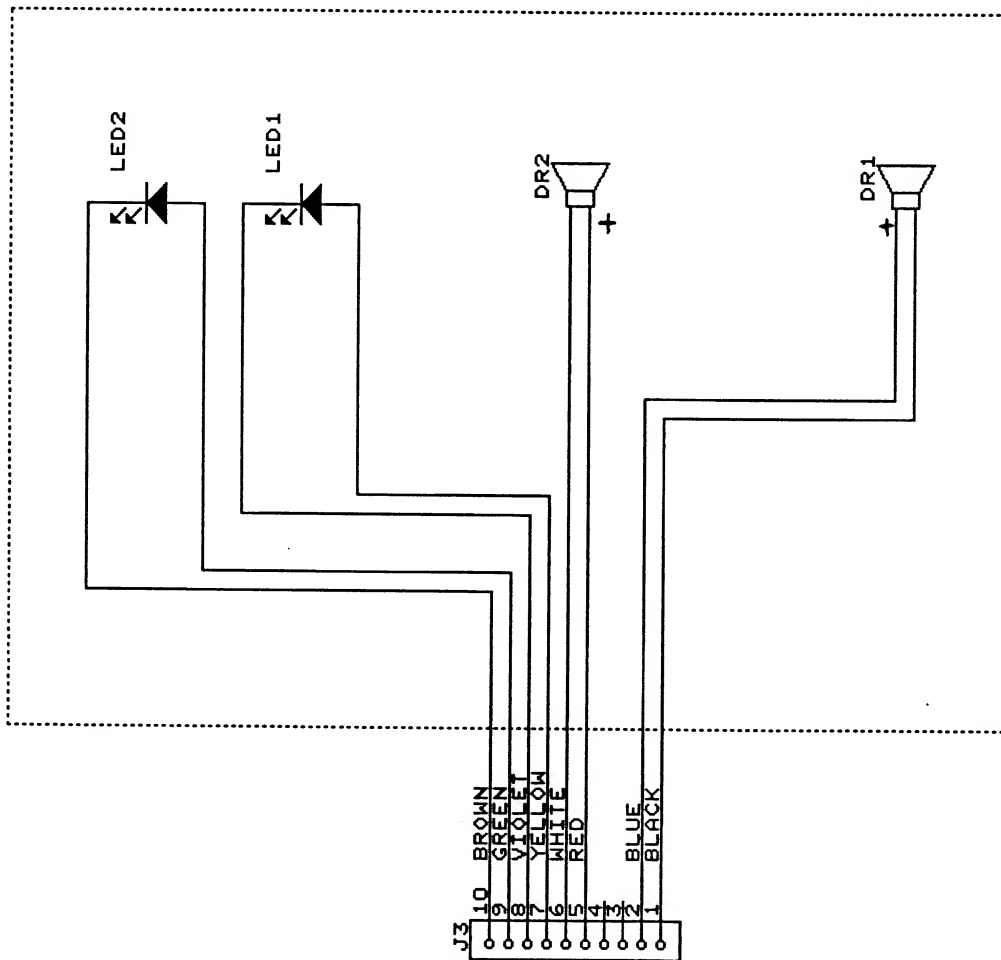
Figure 6.4 1031A Crossover filter, component layout

CLIP/PROTECT LED

POWER-ON LED

TREBLE DRIVER

BASS DRIVER



GENELEC OY

Title

BIAMP 1031A, ENCLOSURE WIRING

Size Document Number

A

REV

Date: September 23, 1991 Sheet of

Figure 6.12 Enclosure wiring diagram

## 2.3 Circuit Description of bass amplifier board

### 2.3.1 Bass power amplifier

The bass bridge connected bass amplifier is located on its own circuit board mounted center to the back plate. The circuitry is similar to that of midrange and treble channel except that there is no input stage and crossover filter board (see Figures 6.12, 6.13). Two parallel connected power transistors are also used at the power stages.

The input signal is taken from the mid/treble amplifier crossover filter output connector J103 by a jumper which is soldered to input connector J502 on the bass amplifier board. The signal from the input connector is routed to the PA-driver board and finally to power transistors via driver stages. The other half of the bridge is effectively an unity gain inverting power stage and it is driven from the output of the first stage via resistor R521. The outputs of the bridge halves are connected to the speaker output connector J704 via relays RL501 and RL601 which act as muting and short circuit protection relays.

### 2.3.2 Protection and muting circuit

The circuitry of protection and muting function of the bass amplifier is shown in Figure 6.14. The relays RL501 and RL601 are driven by flip-flop connected transistors T701, which is set to ON-state at switch on, and T702. T701 is switched to OFF-stage if speaker line short circuit condition is detected by T510 or T610 (see Figures 6.12, 6.13). The flip-flop T701/T702 stays in this condition till the power is switched off momentarily. The red fault LED on the enclosure front panel is illuminated during the malfunction and the bass channel is muted. Transistor T705 delays the relay closing during power on condition. The starting delay for the primary winding of mains transformer is done by relay RL701 which closes after capacitor C711 is charged during switching the power on. The primary current of the mains transformer is routed via resistor R716 and the relay RL701 shorts the resistor after switching the power on.

For driver protection function see section 2.2.2.

### 2.3.3 Power supply

The circuitry of the power supply is shown in Figure 6.14. The primary side of toroidal transformer T1 has two 115 V windings with 100 V taps which can be connected in parallel for 115 V mains voltage or in series for 230 V mains voltage. The selection is done with a voltage selection switch located on the amplifier rear panel. If 100/200 V mains voltage is needed, the 100 V taps are used in the primary windings and 115 V wires are left unconnected. Note that the mains fuse size is different for 115 / 230 V (or 100 / 200 V) settings. The RC-network R301, C301 is a suppressing circuit to damp voltage peaks generated during closing or opening mains switch K301.